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mesophyll cells from excessive light, and made exact measurements as to the efficiency of some of them. Light from a lamp, concentrated by a reflector, was allowed to fall upon the experimental leaves at an angle of 45° in a suitable moist chamber, and the differences measured by means of a thermocouple of needle form, inserted between two pieces of the leaf, and connected with a galvanometer. The cooling by evaporation as a source of error during the exposure (10-15 min.) could not be wholly avoided, but was assumed to be nearly uniform in the control and the experimental leaves.

The results show that hairy, scaly, shining, and glaucous leaves become less heated than the same leaves deprived of protection. A thick white coating of hairs, as in *Centaurea candidissima*, reduces the heating effect 37.5 per cent., shininess up to 30 per cent., and wax coating up to 13.6 per cent. A layer of water reduces it 19.2 per cent.; but this result seems more open to objection on the score of cooling by evaporation than the others, though the author takes it to be as valid as the rest. Reflection is held to be due in some Bromeliaceae to the inner epidermal wall, the cell acting like a concave lens, while epidermal cells that contain brown contents act as shades. The special value of the paper is in its application for the first time of quantitative methods, instead of deductive reasoning.—C. R. B.

Turgor and curvature.—The old problem has been again attacked by KERSTAN,³² namely the question whether, under tropistic stimulation, there first occurs a variation in turgor that causes the curvature, both in growing parts and in motor organs. The evidence accumulating has been all against the idea, so far as concerns growth curvatures, and PFEFFER'S result with *Hordeum* has stood almost alone. KERSTAN adds his testimony that in most cases there is no acceleration of geotropic and heliotropic growth movements by a heightened turgor, and often the cells of the convex side become less turgid. When such curvatures are mechanically prevented, no one-sided or opposed turgor changes occur. Only in the nodes of some grasses does turgor rise on the convex side by 0.5-2 per cent. KNO_3 . This is partly due to the interference with growth, partly to geotropic induction. But the growth reaction occurs in 2.5 hours, and the turgor reaction only after 15. Hence the turgor change does not cause the growth reaction. The geotropic movements by motor organs, as has already been sufficiently proved, are due wholly to turgor. The movements coincide in time with the turgor reaction, which appears to be produced by the migration of soluble materials from the concave to the convex side. The turgor differences do not appear on the clinostat, but turgor increases on all sides. In Marantaceae, however, a very slightly heightened turgor was found in curved petioles, and none could be observed in the imperfect organs of Malvaceae.—C. R. B.

³² KERSTAN, K., Ueber den Einfluss des geotropischen und heliotropischen Reizes auf den Turgordruck in den Geweben. Beitr. Biol. Pfl. 9:163-213. 1907.